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A MODEL OF EMPLOYMENT DECISION MAKING:
AN ANALYSIS OF QUIT/STAY DECISIONS
OF JUNIOR ARMY OFFICERS

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ABSTRACT

PURPOSE:

The purpose of this research is to identify and assess the effect of factors which guide the decisions of junior Army officers to stay or quit the active force. Since these decisions are most important in the early years of career, analyses are done only for junior Army officers.

METHODOLOGY:

A two-equation model is developed to explain the quit/stay decisions of junior Army officers. The Two Stage Least Squares and the Three Stage Least Squares procedures are used to estimate the system of two equations. The two endogenous variables in the system are the officers perceptions of the number of years they expect to serve and their satisfaction with the military life. Aggregation bias is reduced by estimating separate equations for different groups of officers. The equations are estimated using the Army portion of data from the 1985 DOD Survey of Officers and Enlisted Personnel.

FINDINGS:

The research shows that the two most important factors which affect intentions of officers to serve in the Army are satisfaction with the military life and chances of promotion. Satisfaction with the military life in turn depends on good retirement and medical benefits, satisfaction with pay and allowances, educational and recreation facilities, employment opportunities for spouses, working conditions, job security, commissary services and environment for the family.

The estimation results suggest that non-white officers, male officers, older officers, officers with longer service, non-academy graduates and officers with Army specific skills (e.g. officers in combat arms) intend to serve in the Army for a longer time period as compared to officers with skills transferable to civilian sector.

Correction for aggregation bias shows that officers with Army specific skills are more responsive to monetary inducements than officers with general skills.

POLICY IMPLICATIONS:

The research results can be used to define and test policies designed to achieve (a) a targeted strength of active officers, and/or (b) a desired mix of officers. The officers can be induced to serve in the active force through better compensation packages, promotion chances, better retirement, medical and educational facilities, employment opportunities for spouse, improved environment for the family and at work. Specific policies can be designed to achieve a desired mix of officers.

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A MODEL OF EMPLOYMENT DECISION MAKING:
AN ANALYSIS OF QUIT/STAY DECISIONS OF JUNIOR ARMY OFFICERS

EXECUTIVE SUMMARY

OBJECTIVES:

The objective of this research is to identify and assess the effect of factors which guide the decisions of junior Army officers to stay or quit the active force. Since these decisions are most important in the early years of career, analyses are done only for junior Army officers. Junior Army officers are defined as those officers who are in the pay grade level 01 to 04.

DATA USED FOR ANALYSIS:

The research work is based on the Army portion of the data from 1985 DoD Survey of Officers and Enlisted Personnel. The Survey was administered by mail in February through May of 1985 to a stratified random sample of the active duty military population.

METHODOLOGY:

A two-equation model is developed to explain the quit/stay decisions of junior Army officers. The Two Stage Least Squares and the Three Stage Least Squares procedures are used to estimate the system of two equations. The two endogenous variables in the system are the officers perceptions of the number of years they expect to serve and their satisfaction with the military life. Aggregation bias is reduced by estimating separate equations for different groups of officers.

FINDINGS:

The research shows that the two most important factors which affect intentions of officers to serve in the Army are satisfaction with the military life and chances of promotion. Satisfaction with the military life in turn depends on good retirement and medical benefits, satisfaction with pay and allowances, educational and recreation facilities, employment opportunities for spouses, working conditions, job security, commissary services and environment for the family.

The estimation results suggest that non-white officers, male officers, older officers, officers with longer service, non-academy graduates and officers with Army specific skills (e.g. officers in combat arms) intend to serve in the Army for a longer time period as compared to officers with skills transferable to civilian sector.

Correction for aggregation bias shows that officers with Army specific skills are more responsive to monetary inducements than officers with general

skills. It is also found that the officers trained at West Point can be induced to serve for a longer period of time through higher monetary remunerations. A further analysis shows that it is cost effective to retain these officers through such higher monetary remuneration.

Finally, the importance of various facilities and benefits programs varies from one group of officer to the other.

POLICY IMPLICATIONS:

The research results can be used to define and test policies designed to achieve (a) a targeted strength of active officers, and/or (b) a desired mix of officers. The officers can be induced to serve in the active force through better compensation packages, promotion chances, better retirement, medical and educational facilities, employment opportunities for spouses, and improved environment for the family and at work.

Since the responsiveness to various factors varies for different groups of officers, policies should be tailored to achieve a desired mix of officers. Such an objective can be achieved, perhaps, by providing cafeteria type of benefits. For example, increases in Regular Military Compensation (RMC) will induce officers in combat-arms or with non-scientific training to serve in the Army for a longer time period but will have no significant effect on the decisions of engineers, scientists or medical officers. .

LIMITATIONS:

The research analyzes retention intentions of officers and not their actual behavior.

PROPOSED WORK:

The analyses should be extended to consider and understand the actual behavior of the officers.

Additional work is proposed in two areas: (1) Analyses of quit/stay decisions of members of Reserve Component/National Guards. (2) Analyses of quit/stay decisions of civilian labor force with similar educational, ethnic and demographic background as junior Army officers.

A better understanding of labor mobility in the two areas cited above will enable policy makers to develop policies which can more positively influence the retention decisions of junior Army officers. Also, the policy makers may be able to formulate policies to achieve a desired mix between Active and Reserve Component.

1.0 INTRODUCTION

Each year the U.S. Army invests substantial funds in recruiting and training personnel. This cost is a function of: (1) established manning levels, (2) attrition rates due to retirement and early departure from service, and (3) the level and mix of skills required to man weapon systems and to meet combat-support requirements. Historically, as weapon systems and combat-support roles have become more sophisticated and skill-intensive, the average training cost per soldier has increased. There is also a temporal dimension to these increased training costs. Namely, the length of time in service required to become proficient in weapon system operation, management and support tasks has also been increasing. Thus, in order to capitalize the benefits of personnel related investments and to maintain acceptable combat readiness levels, it is important to maintain high retention rates within the U.S. Army.

The objective of this research work is to identify factors which influence retention decisions of Army officers. Specifically, a multi-variate multi-disciplinary regression model is developed which attempts to identify the factors that affect the intentions of officers to serve in the Army. The factors affecting the intentions to serve in the Army are demographic, economic and psychological. This research shows that the satisfaction with the military life is one of the important determinants of intentions to continue serving in the military. The factors which in turn affect the satisfaction with the military life are also identified. The model is estimated by using Two Stage Least Squares (2SLS) and Three Stage Least Squares (3SLS) procedures.

In this research, the analysis of quit/stay decisions is restricted to junior Army officers because such decisions are important in the early years of career. Junior Army officers are defined as those officers who are in the pay grade level 01 to 04. The ranks of officers in these pay grade levels are, respectively, Second Lieutenant, First Lieutenant, Captain and Major. Once the officers have vested ten or more years of their career life they tend to stay with the Army until retirement, if required by the Army.

It is recognized in economic literature that the effect of various factors on mobility of labor depends on whether labor has acquired firm specific or general skills. To take into account such issues, separate models are estimated for officers in combat and non-combat arms. Also, based on their training, junior Army officers are classified into two groups. The first group includes officers who are engineers, scientists or medical professionals. The second group includes all other officers. It is hypothesized that the first group has general skills which can be more easily transferred to the civilian sector, whereas the second group has Army specific skills. Separate models are again estimated for these two groups.

Aggregation of male and female officers can yield biased results, for example, if the expected years of service of male officers are higher than those of female officers, their aggregation would yield biased results. To avoid aggregation bias due to sex, separate models are estimated for male and female officers. Finally, an analysis is performed to see how the retention decisions differ for officers commissioned under different programs.

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Separate models are estimated for military academy graduate officers (West Point), direct recruits from the civilian labor force, officers hired through Reserve Officer Training Corps (ROTC) regular and scholarship programs.

Section 2 briefly reviews the existing literature on quit/stay decisions. Section 3 describes the data used in this analysis. In Section 4, a model is specified to analyze the intentions of junior Army officers to serve in the Army. The results of the estimation of the model are also discussed in this section. Section 5 summarizes the major findings and suggests some implications of thse findings. Some limitations of this research are also enumerated in this section. The report concludes by suggesting some areas for further research.

2.0 LITERATURE REVIEW

The initial literature on labor turnover (quits or separations) concentrated on the decision-making by employees (Stoikov and Reimon, 1968; Burton and Parker, 1967) in different industries. The recent literature on turnover includes employer's utility function but is restricted to wage and training cost. For example, Pencavel (1972) noted that a profit-maximizing firm will not set wages independently of quit rates (Q) but will instead, choose a wage-Q mix which is perceived <u>a priori</u> to be optimal. If actual Q increases, the firm responds by increasing wages and if actual wages exceed the optimal, the firm increases layoffs. He demonstrated that wages higher than the optimal wage tended to reduce Q and increase layoff rates. Bloch (1979) argued that the effect of wages on layoff rates was ambiguous. Parsons (1977) reviewed five studies that related Q to several explanatory variables and concluded that Q decreased both with an increase in wages and with an increase in such general skill level as education. Antel (1986) concluded that the voluntary mobility of labor is inhibited by specific training.

The analysis of mobility of Army officers is in some ways similar to the analysis of civilian labor mobility and in other ways it is not. As long as officers are perceived as decision making units, their behavior will be guided by similar factors as in any other industrial sector. For example, after the initial obligation of service of five years is completed, an officer is free to separate from the Army. But, from the employer's perspective, profit-maximization is not the principle which guides the wage-Q mix. The Army is maintained to provide national security and its maintenance does not depend on the maximization of private benefits. Therefore, it is not possible to construct a maximization model and obtain optimal level of wage-Q mix. The objective here is to identify the factors which influence the quit/stay decisions of junior officers and then to assess the impact of these factors on the decision making process.

In the last decade researchers have analyzed the factors that affect the quit/stay decisions of civilian and military labor. In their survey article Mobley et al. (1979) point out that voluntary employee turnover depends on age of the employee, overall job satisfaction, organizational and work environment, job content, external environment, salary and the difference between actual and expected salary. The survey collected results of various types of research conducted in the civilian sector. The approach taken in these analyses was basically psychological and rested on the belief that turnover is an individual choice behavior. Thus, the individual was the primary unit of analysis. An individual's decision depended on his perception and evaluation of available alternatives relative to the present position.

Arnold and Feldman (1982) analyzed turnover of 654 accounting professionals using multi-variate analysis. Their analysis showed that age, job satisfaction, commitment to organization and tenure in organization were negatively related to turnover. Also, family responsibility, measured by marital status and number of dependents, led to smaller turnover.

The U.S. military is facing the problem of high attrition rates of both enlisted personnel and officers. Research in this area is being conducted

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to understand the behavior of attritees. Gotz and McCall (1983) constructed a dynamic programming model to analyze the effect of promotion probabilities, retirement probabilities, income and civilian income opportunities on stay/leave decisions of all Air Force officers. Their research considered the effect of only monetary variables on stay/leave decisions. Their problem was to predict how officers would react under different retirement systems and under different promotion probabilities. In the more recent literature, the problem of retention of military personnel is analyzed in a somewhat broader perspective. These models go beyond considering the effect of monetary factors on retention. They are multi-disciplinary in nature and take into account the effect of family satisfaction on retention and readiness of military personnel and officers. Some of these models are described below.

Lakhani et al. (1985) used factor analysis and multi-variate logit models to identify the factors which affect (a) satisfaction of soldiers and officers with family life, and (b) their intentions to extend Europeon tour. The data from the Army Families in Europe Survey, 1983, were used to estimate these models. The factor analysis of the 43 correlated variables as well as results of the multivariate logistic equations revealed that job satisfaction and satisfaction with family life were the most important determinants in the decision of officers and enlisted personnel to extend their Europeon tours. The authors concluded that the smaller lump sum bonuses provide better incentives to extend the tour as compared to the higher monthly installment bonuses.

In a more recent paper, Lakhani (1988) estimated a system of equations (using 3SLS procedure) in which he analyzed the impact of regular military compensation (RMC) and selective reenlistment bonus (SRB) on quit rates, and of quit rates, training costs, and potential civilian wages of soldiers on SRB. His results reveal that an increase in RMC and SRB reduces quit rates. Lakhani also estimated separate sets of equations for soldiers in combat and non-combat arms. He hypothesized that soldiers in combat arms are imparted firm specific training by the Army, and are, therefore, less readily transferable to civilian sector. His estimation results confirm the hypothesis that supply of soldiers is more responsive to wage incentives in combat arms than in non-combat arms.

In recent years there has been a growing belief that dissatisfaction of military spouse with employment opportunities adversely affects the intentions of soldiers to reenlist or to stay. Schwartz et al. (1987) examined such issues for wives of enlisted soldiers. Their analysis indicated that Army spouses participated less in the labor force and had higher unemployment compared to demographically similar civilian spouses. Unemployment and frequency of Permanent Change of Station (PCS) moves were found to be significant negative factors in spouses' satisfaction with military life. Spouses' dissatisfaction, in turn, has important implications for retention and readiness of Army personnel. Schwartz et al. obtained Army data from the 1985 DoD Survey of Officers and Enlisted Personnel and civilian data from the Census Bureau's Current Population Survey.

Similar results were obtained in the analysis of quit/stay decisions of Air Force officers. Smith (1987) concluded that holding other factors con-

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stant, an officer whose spouse is in the labor force is less likely to stay in the Air Force than an officer whose spouse is not in the labor force. Using the 1985 DoD Survey of Officers and Enlisted Personnel, Smith estimated two reduced form equations: one to estimate labor supply for wives of Air Force officers and the other to estimate retention decisions of Air Force officers. Spouse employment is one of the explanatory variables in retention decisions of Air Force officers. The effect of spouse employment is negative on the retention of the Air Force officers.

In a recent publication, the U.S. Government Accounting Office (1987) cites similar concerns about retaining Air Force pilots. According to this study, the key factors which affect retention of Air Force pilots are increased job opportunities in the private sector, the widening pay comparability gap, threats to the retirement system, the perceived erosion of benefits, the high cost of PCS moves, and working spouses.

The cost of commissioning an officer by source was analyzed by Benjamin Schemmer in the Washington Post (December 1, 1985). He noted that the cost of a West Point graduate was $225,000 compared to only $27,400 for an ROTC officer and $2,250 from an Officer Candidate School (OCS). Hence, if the West Point graduate officer stays with the Army for a shorter period compared to an ROTC or an OCS officer, commissioning more officers from the West Point is not likely to be cost-effective for the Army.

The models described above emphasize that retention decisions of military personnel depend not only on monetary compensation but on other factors as well. Some of the major factors which influence retention decisions are satisfaction with military life, work environment, chances of promotion, educational and training facilities, potential alternatives in the civilian sector, frequency of PCS moves and employment opportunities for spouse. Most models (with the exception of Lakhani, 1988) estimate separate equations for spouse employment and retention decisions. In the equation for retention decisions, spouse employment appears as one of the explanatory variables. The two equations are not treated as members of the system of equations. Therefore, the estimation techniques give inconsistent estimates. Lakhani (1988) developed a system of equations but the number of explanatory variables in his model were very restricted. The aim of this research is to develop a system of equations which explains retention decisions based on as many explanatory variables as possible, so as to avoid the omitted variables bias. As discussed earlier, the analysis is restricted to junior Army officers. The data for this analysis is obtained from the 1985 DoD Survey of Officers and Enlisted Personnel.

3.0 DATA DESCRIPTION

This research work is based on the Army portion of the data from the 1985 DoD Survey of Officers and Enlisted Personnel. This survey was administered by mail in February through May of 1985 to a stratified random sample of the active duty military population. Approximately, 5,000 Army officers completed the survey, a response rate of 65%. The survey collected information on a member's military, personal and family characteristics; his/her career intentions; and his/her satisfaction with a variety of military programs and services.[1]

A subset of Army officers surveyed are used for this analysis. First, the analysis is restricted to only junior Army officers where junior Army officers are defined to be those who are in the pay grade 01 to 04. Data is available for 3,571 junior Army officers.

Second, the sample is restricted to the officers who have spouses. The focus of this research is to analyze the affect of spouse employment, family support services, and other benefits on intentions to serve in the Army. Therefore, it seems logical to restrict the analysis to the officers with spouses.

Third, there are two dependent variables in the model specified in Section 4.0. The first dependent variable is the response to the question:

"When you finally leave the military, how many total years of service do you expect to have?"

The second dependent variable is the response to the question:

"How satisfied are you with the military as a way of life?"

Some officers did not respond to these questions, therefore, other data pertaining to these officers could not be used for the analysis.

Finally, there is missing information on some other key variables selected for this analysis. As a consequence, such observations have to be omitted. Useful information is available for 1,910 officers. This is the sample size for this analysis.

Some of the major characteristics of the officers included in the analysis are:

● The average officer is 32 years old and earns an annual military compensation of $26,000 and has served in the Army for approximately

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[1] For more details on the 1985 DoD Survey, see Mary Ellen McCaller et al. "Description of Officers and Enlisted Personnel in the U.S. Armed Forces: 1985", Defense Manpower Data Center, October 1986, and the other reports listed there.

9 years; approximately 58% of the officers have served in the Army for less than 10 years.

- The Army is dominated by male white officers with 85% white officers and 79% males. Only 11% of the officers are Academy graduates. The largest percentage of officers (33%) is recruited through ROTC regular programs. Thirty-two percent of the officers are engineers, scientists or medical professionals.

- Fifteen percent of the officers intend to serve in the Army for less than 10 years, though 52% believe that their families will be better off if they quit active duty and work as civilians. After leaving active duty, 27% of the officers intend to join the Reserve Force/National Guard. Twenty percent of the officers believe that the probability of their promotion is low, and 35% of the officers are in combat arms.

- Of the spouses, 62% are employed either full-time or part-time.

Table 1 shows satisfaction/dissatisfaction with selected benefits. Approximately 80% of the officers are satisfied with military life as such. About 30% (or less) of the officers are dissatisfied with various benefits listed in Table 1. Even though the percentage of dissatisfied officers is moderate, Army managers may wish to minimize dissatisfied officers for improved retention rates and better readiness.

In this research, aggregation bias is reduced by estimating separate models for sub-groups of officers. Officers are classified by (a) sex, (b) type of training, i.e. scientific versus non scientific, (c) combat arms versus non-combat arms, and (d) source of commission. Table 2 shows characteristics of officers by these classifications. On the average, officers hired through ROTC scholarship programs are youngest (29.4 years), and those hired directly though the civilian labor force are oldest (34.2 years). The male officers and officers in combat arms have, on the average, the longest years of services (9.7 years). The female officers have served in the Army for shortest length of time (6.6 years). On the average, officers who are engineers, scientists or medical professionals by training, earn the largest monetary remunerations ($27,300). The female officers and officers hired through ROTC scholarship programs earn the least ($23,500). It should be noted that the range in any of these attributes is not very large.

Table 2 also shows the percentage of officers who intend to serve in the active force for less than 10 years, the percentage of officers who are satisfied with Army life, and the percentage of officers with working spouses. A small percentage (approximately 10% to 11%) of male officers, combat arms officers and officers hired through ROTC regular programs intend to serve in the active duty for less than 10 years. Approximately, 30% of female officers intend to serve in the Army for less than 10 years. In general, 70% to 80% of the officers in each category are satisfied with the military life. The percentage of working spouses varies across classification of officers. As expected, female officers have the largest percentage of working spouses (88.6). This is followed by officers who are directly hired from the civilian

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TABLE 1:   SATISFACTION WITH MILITARY LIFE AND SELECTED BENEFITS

	% Satisfied	% Neither Satisfied nor Dissatisfied	% Dissatisfied
Military Life	79	4	17
Pay & Allowances	52	23	25
Chance of Promotion	58	16	26
Retirement Benefits	68	20	12
Educational Benefits	58	23	19
Medical Care	53	16	31
Commissary Services	70	16	14
Frequency of Moves	44	25	31
Family Environment	60	20	20
Working Condition	60	18	22

Source: Survey of Officers and Enlisted Personnel, Sponsored by Defense
Manpower Data Center, 1985, Department of Defense.

TABLE 2

MAJOR ATTRIBUTES OF SUB-GROUPS OF OFFICERS

Classification of Officers	Percentage of Officers	Average Age (in years)	Years of Service	RMC (in $1,000)	% of officers who intend to serve for less than 10 years	% of officers satisfied with Army life	% of Employed Spouses
Male	79.4	32.6	9.7	26.7	11.1	80.0	54.7
Female	20.6	30.4	6.6	23.5	29.4	76.4	88.6
Engineers, Scientist or Medical Professionals	31.9	33.0	8.6	27.3	20.5	74.4	65.0
Other Officers	68.1	31.8	9.2	25.4	12.3	80.8	60.1
Officers in Combat Arms	35.4	32.1	9.7	26.4	9.6	8?.2	52.4
Officers in Non-Combat Arms	64.6	32.2	8.6	25.8	17.7	71.4	66.8
Academy Graduates	10.9	29.9	8.1	24.5	16.7	77.0	57.9
ROTC Regular Officers	33.6	32.2	9.3	25.8	10.6	82.1	59.3
ROTC Scholarship Officers	19.5	29.4	7.1	23.5	19.6	78.0	61.8
Direct Hirees through Civilian Labor Force	11.9	34.2	7.8	26.5	21.1	74.6	72.4

Source: Survey of Officers and Enlisted Personnel, Sponsored by Defense Manpower Data Center, 1985, Department of Defense.

labor force with 72.4% having working spouses. Officers in combat arms have the lowest percentage of working spouses (52.4).

The differences in these basic characteristics may be helpful in understanding the results of the model presented in Section 4.0 and using them for policy formulations.

4.0 MODEL SPECIFICATION AND ESTIMATION

4.1 Model Specification

The objective of this research is to identify and understand factors that influence the decisions of junior Army officers to stay or not to stay in the active service. There is growing evidence that such decisions are guided by psychological and sociological factors as well as economic factors. The model developed here takes into account multi-disciplinary factors in analyzing the retention decisions of junior Army officers. Recent advances in psychological literature include the path analysis modelling in which retention intentions are explained directly by some variables and indirectly by others (Motowidlo and Lawton, 1984). Psychologists and sociologists have been using the LISREL model to explain the direct and indirect effects. These developments are similar to the use of a system of simultaneous equations in economics and statistics. We plan to use a system of simultaneous equations to explain the direct and indirect effects on retention. Specifically, a two-equation model is developed to analyze the quit/stay decisions. The first equation of the model specifies satisfaction with military life and other factors that influence the retention intentions of officers. The second equation spells out the factors which influence satisfaction with military life. The two equations constitute the system and are estimated using procedures to estimate a system of equations. It is assumed that these two major variables are interdependent and hence have to be estimated jointly and simultaneously. The Army portion of the data from the 1985 DoD Survey of Officers and Enlisted Personnel is used to estimate the model parameters.

In the DoD 1985 survey, the officers were asked to respond to the question:

"When you finally leave the military, how many total years of service do you expect to have?"

Responses to this question are the dependent variable in the first equation indicating the number of years officers intend to serve in the Army. This research is confined to the analysis of the intentions of the officers to serve in the Army. Whether these intentions indeed materialize is the subject matter for future research (Motowidlo and Lawton (1984)). It is hypothesized that the number of years an officer intends to serve in the Army depends upon satisfaction with the military life, monetary compensation for service, age, race and sex of officer, promotion potential, length of service, source of commission, probability of transfer to an undesirable location, and the time spent overseas. The intentions to serve are also affected by whether the officer is in combat arms or not. The first equation of the model is specified as follows:

$$
\begin{aligned}
\text{SERVYR} = {} & a_0 + a_1 \text{ MISAT} + a_2 \text{ LRMC} + a_3 \text{ AGE} + a_4 \text{ RACE} + a_5 \text{ YOS} + \\
& a_6 \text{ SEX} + a_7 \text{ ACGRAD} + a_8 \text{ ROTCRG} + a_9 \text{ ROTCSC} + a_{10} \text{ DCIVIL} \\
& + a_{11} \text{ NMOS} + a_{12} \text{ YGUARD} + a_{13} \text{ PROM} + a_{14} \text{ OVERSEAS} + \\
& a_{15} \text{ UNLOCALE} + u_1 \quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (1)
\end{aligned}
$$

Table 3 defines the terms used in the equation.

It is hypothesized that the number of years expected to serve and the satisfaction with the military life are jointly determined. The more satisfied an officer is with the military, the more years he/she is likely to serve in the Army. Furthermore, the greater the number of years an officer intends to serve in the Army, the more satisfied he/she is with the Army life.

Satisfaction with Army life depends not only on monetary remuneration, but also on various other factors that affect the officers and their families. The factors which directly affect the officers are morale of military personnel at current location, opportunity to serve the country, job training or in service education, working conditions, job security, satisfaction with the job, chances of promotion, retirement benefits, and pay and allowances. Satisfaction with Army life is also influenced by perceptions officers have about military and civilian life. The discussion of current literature in Section 2 indicated that the status of spouse employment has considerable impact on retention decisions of officers. Other factors which affect the satisfaction of an entire family are medical care and recreation facilities, frequency of moves, commissary services, and the general environment for the family. In the second equation of the model, the relationship is developed between satisfaction with military life and the above mentioned factors. Amongst the right hand side variables of equation (2), SERVYR is the only variable which enters from equation (1). There are several exogenous variables in one equation which do not appear in the other equation and hence can be used as instruments for endogenous variables. Therefore, there are no problems in the identification of the model. The second equation is specified as follows:

$$
\begin{aligned}
\text{MISAT} = \ & b_0 + b_1 \text{ SERVYR} + b_2 \text{ EMPS} + b_3 \text{ MORALE} + b_4 \text{ EXMILIFE} + b_5 \text{ FAMBET} \\
& + b_6 \text{ RETBEN} + b_7 \text{ EDUCBEN} + b_8 \text{ MEDCARE} + b_9 \text{ PRFREE} + b_{10} \text{ FRIEND} \\
& + b_{11} \text{ PAYALL} + b_{12} \text{ ENVFAM} + b_{13} \text{ FREQMV} + b_{14} \text{ CONTSV} + b_{15} \text{ JOBSAT} \\
& + b_{16} \text{ PROMOT} + b_{17} \text{ JOBSEC} + b_{18} \text{ WKCOND} + b_{29} \text{ SRECSV} + \\
& b_{20} \text{ COMSERV} + u_2
\end{aligned}
\tag{2}
$$

Table 4 defines the variables used in this equation.

Equations (1) and (2) are two equations of the model which determine simultaneously the number of years an officer intends to serve in the Army and satisfaction with the military life. All the factors which affect satisfaction with the military life affect indirectly the number of years officers intend to serve in the Army.

4.2 Estimation Procedures

In the model specified in Section 4.1, the two variables whose values are explained by the model are the number of years intended to serve in the Army and satisfaction with the military life. Neither of these variables is dichotomous. The value of the first variable ranges from zero years to 49 years. The value of the second variable ranges from one to seven where one

TABLE 3:   DEFINITION OF THE VARIABLES USED IN THE FIRST EQUATION*

Variable Name	Description
SERVYR	Total years expected to serve in the Army.
MISAT	Satisfaction with the military as a way of life (very dissatisfied = 1, very satisfied = 7).
LRMC	Logarithm of Regular Military Compensation (RMC), where RMC = WAGES + BAS + BAQ + VHA.**
AGE	Age of the Army officer at his/her last birthday.
RACE	A dummy variable equal to one for white officers; and zero otherwise.
YOS	Number of years of service on active duty.
SEX	Sex of the officers (Male = 1, Female = 2).
OCCUP	A dummy variable equal to one for mobile skills such as engineering, scientific and medical; and zero otherwise.
AGRAD	A dummy variable equal to one for Academy graduates; and zero otherwise.
ROTCRG	A dummy variable equal to one if ROTC (Regular); and zero otherwise.
ROTCSC	A dummy variable equal to one if ROTC (Scholarship); and zero otherwise.
DCIVIL	A dummy variable equal to one if direct appointment from civilian status; and zero otherwise.

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*Appendix A shows the corresponding SAS variables for each variable described here.

**The following terms are defined by the Defense Manpower Data Center as follows:

WAGES	=	Taxable Military Income
BAS	=	Basic Allowance for Subsistence
BAQ	=	Basic Allowance for Quarters
VHA	=	Variable Housing Allowance

TABLE 3: DEFINITION OF THE VARIABLES USED IN THE FIRST EQUATION* (Continued)

Variable Name	Description
YGUARD	A dummy variable equal to one for officers who would most likely join the National Guard or reserve unit after quitting the Army; and zero otherwise.
PROM	Chance of promotion in the next higher pay grade (no chance = 1, certain = 11).
OVERSEAS	Number of months spent at an overseas location.
UNLOCALE	Chance of next tour of duty to an undesirable military location (no chance = 1, certain = 11).
NMOS***	A dummy variable equal to one for combat arm officers; and zero otherwise.
u_1	Random error term.

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*Appendix A shows the corresponding SAS variables for each variable described here.

***Appendix B Shows the codes for officers in combat arms.

TABLE 4: DEFINITION OF THE VARIABLES USED IN THE SECOND EQUATION*

Variable Name	Description
EMPS	A dummy variable equal to one if spouse is employed; and zero otherwise.
MORALE	Morale of military personnel at current location (Low Morale = 1, High Morale = 7).
EXMILIFE	Life in the military is about what it is expected to be (Strongly Agree = -1, Strongly Disagree = -5).
FAMBET	Family could be better off if officer took a civilian job (Strongly Agree = -1, Strongly Disagree = -5).
RETBEN	Retirement benefits (Very Satisfied = -1, Very Dissatisfied = -5).
EDUCBEN	Job training/in-service education (Very Satisfied = -1, Very Dissatisfied = -5).
MEDCARE	Medical care (Very Satisfied = -1, Very Dissatisfied = -5).
PRFREE	Personal Freedom (Very Satisfied = -1, Very Dissatisfied = -5).
FRIEND	Acquaintances/Friendship (Very Satisfied = -1, Very Dissatisfied = -5).
PAYALL	Pay and Allowances (Very Satisfied = -1, Very Dissatisfied = -5).
ENVFAM	Environment for Families (Very Satisfied = -1, Very Dissatisfied = -5).
FREQMV	Frequency of Moves (Very Satisfied = -1, Very Dissatisfied = -5).
CONTSV	Opportunity to serve country (Very Satisfied = -1, Very Dissatisfied = -5).
JOBSAT	Safisfaction with current job (Very Satisfied = -1, Very Dissatisfied = -5).

*Appendix A shows the corresponding SAS variables for each variable described here.

TABLE 4: DEFINITION OF THE VARIABLES USED IN THE SECOND EQUATION* (Continued)

Variable Name	Description
PROMOT	Promotion opportunities (Very Satisfied = -1, Very Dissatisfied = -5).
JOBSEC	Job security (Very Satisfied = -1, Very Dissatisfied = -5).
WKCOND	Work/Environmental conditions (Very Satisfied = -1, Very Dissatisfied = -5).
COMSERV	Commissary services (Very Satisfied = -1, Very Dissatisfied = -5).
SRECSV	A dummy variable equal to one for satisfaction with recreation program; and zero otherwise.
u_2	Random error term.

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*Appendix A shows the corresponding SAS variables for each variable described here.

represents very dissatisfied officers and seven represents very satisfied officers.

The Ordinary Least Squares (OLS) method can be used to estimate the model specified in Section 4.0. Under the OLS technique unbiased or consistent estimates of parameters are obtained if and only if all explanatory variables appearing on the right hand side of the equation are uncorrelated with the error term. But in equations (1) and (2) it is hypothesized that MISAT and SERVYR are determined jointly. Therefore, they are correlated with the error term and the OLS procedure will produce biased and inconsistent estimates.

Equations (1) and (2) are part of a system of simultaneous equations where both SERVYR and MISAT are explained by the model. Consistent estimates for such a model can be obtained by using 2SLS or 3SLS procedures. In a 2SLS procedure each equation of the model is estimated separately in two stages. In the first stage, the value of the endogenous variable, appearing on the right hand side of the equation, is estimated using explanatory variables of the model. The estimated value thus obtained is uncorrelated with the error term. In the second stage, the estimated value of the endogenous variable is used to obtain parameter estimates. The estimates thus obtained are consistent.

The single equation estimates obtained by using 2SLS procedure are, in general, asymptotically inefficient. The reason for the lack of asymptotic efficiency is the disregard of the correlation of the disturbances across equations. Thus, the 2SLS procedure does not use all the available information in estimating the equations. This deficiency can be overcome by estimating all equations simultaneously. The 3SLS procedure does that. The model specified in Section 4.1 is estimated by using both 2SLS and 3SLS procedures. The results of the estimation obtained under different procedures are discussed and compared in Section 4.4.

4.3 2SLS Estimates of the Model

As discussed in Section 4.1, the first equation of the model develops a relationship between the number of years officers intend to serve in the Army and other explanatory variables. The 2SLS procedure is used to estimate the equation because it is hypothesized that SERVYR and MISAT are jointly determined. Table 5 shows the results of estimation.[2] These results are very encouraging. All coefficients have the expected sign and approximately half of them are statistically significant at the 95% level of significance.

The estimation results suggest that satisfaction with the military life has a strong positive influence on the intentions to serve in the Army. The more satisfied the officers are with Army life the longer they intend to serve

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[2]The parameter estimates do not suffer from multicollinearity because significant correlation is not present between any two explanatory variables. Appendix C shows the correlation matrix for a few selected variables.

TABLE 5: 2SLS ESTIMATES FOR THE FIRST EQUATION EXPLAINING SEVYR

VARIABLE	DF	PARAMETERS	STD.ERROR	T VALUE	PROB > |T|
INTERCEPT	1	-2.96503182	6.10397182	-0.486	0.6272
MISAT	1	1.37921795*	0.13482818	10.229	0.0001
LRMC	1	0.49819220	0.63418558	0.786	0.4322
AGE	1	0.11162567*	0.04883962	2.286	0.0224
RACE	1	-0.20744576	0.32599082	-0.636	0.5246
YOS	1	0.32996415*	0.04838541	6.819	0.0001
SEX	1	-1.97174653*	0.33776260	-5.838	0.0001
OCCUP	1	-0.67572438*	0.27698990	-2.440	0.0148
ACGRAD	1	-0.01708367	0.44959315	-0.038	0.9697
ROTCRG	1	0.42002308	0.32023206	1.312	0.1898
ROTCSC	1	0.47539045	0.37760921	1.259	0.2082
DCIVIL	1	0.39702128	0.44957995	0.883	0.3773
NMCS	1	0.40496887	0.26694930	1.517	0.1294
YGUARD	1	-1.82195767*	0.28425608	-6.410	0.0001
PROM	1	0.76523852*	0.04077807	18.766	0.0001
OVERSEAS	1	0.009871473	0.006126860	1.611	0.1073
UNLOCALE	1	-0.02617269	0.04787912	-0.547	0.5847

* t-statistic significant at the .05 level.

in the Army. Satisfaction with the military life in turn depends on various family support programs, psychological factors, medical benefits and retirement benefits, discussed later.

The regular military compensation (RMC) has a positive effect on the intentions of the officers to serve in the Army. In equation (1) this variable is transformed in natural logarithms. The coefficient for this variable is not statistically significant at the 95% level of significance. In the initial stages of this study, off-duty income of officers and income from sources other than RMC were also included as explanatory variables. The coefficients for these variables had correct signs but their magnitude was very small and they were statistically insignificant. Therefore, in the final version of the equation they were not included.

It is not surprising to find that the age of the officers (AGE) has a positive effect on the intentions of officers to serve in the Army. The older the people get, the more reluctant they become to switch jobs. The coefficient for this variable is statistically significant at the 95% level of significance.

The race (RACE) coefficient is negative and statistically insignificant. The negative relationship implies that non-white officers intend to serve in the Army for longer-term.

The coefficient for years of service (YOS) is positive and statistically significant at the 95% level of significance. The increase in the years of service increases the desire to take advantage of Army benefits, especially retirement.

The co-efficient for sex (SEX) indicates that female officers intend to serve for fewer years in the Army relative to male officers. The coefficient is statistically significant at the 95% level of significance.

The estimation results confirm the hypothesis that officers with Army specific skills intend to serve in the Army for a longer time period compared to the officers who possess general skills. This phenomenon is observed in the coefficients for two variables, namely OCCUP and NMOS.[3] The officers are divided into two groups on the basis of their training. The first group includes engineers, scientists and medically trained professionals and the second group includes all other officers. The officers in the first group can be more easily absorbed in the civilian sector as compared to the officers in the second group. The variable OCCUP is a dummy variable with value of one for the first group of officers and zero otherwise. The coefficient for OCCUP is negative and statistically significant at the 95% level of significance, indicating that officers in the second group intend to serve in the Army for a longer time period.

The variable NMOS is a dummy variable where values one and zero indicate respectively that officers are in combat arms or in non-combat arms. The

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[3]Appendix B shows the codes which are used to classify officers in combat arms.

coefficient is positive and it is statistically significant at the 85% level of significance. This indicates that officers in combat arms intend to serve in the Army for a longer time period compared to officers in non-combat arms. This behavior can perhaps be explained by the fact that if an officer receives a command position he/she is likely to progress faster in the Army. Again, the behavior of officers in combat arms supports the hypothesis that Army specific labor is less mobile.

The four variables ACGRAD, ROTCCRG, ROTCSC and DCIVIL measure the effect of the source of commission of officers on their intentions to serve in the Army. The coefficients of these variables indicate that academy graduates intend to serve for fewer years than other officers. However, the coefficients for these variables are statistically insignificant.

The coefficient for YGUARD clearly indicates that the officers who intend to leave the active force intend to join the National Guard or the Reserve Force. The coefficient for YGUARD is significant at the 95% level of significance.

The chance of promotion (PROM) has a strong positive influence on the intentions to serve in the Army. This coefficient is statistically significant at the 95% level of significance.

The estimation results also indicate that the overseas (OVERSEAS) duty positively influences the officers intentions to serve in the Army for a longer period of time. This result could perhaps be explained by the fact that the analysis is limited to the junior Army officers who may have more enthusiasm and desire to travel around the globe. Also, perceived chance of promotion increase with more overseas duties. Even though the officers do not consider overseas assignment as a negative factor, they do not want an assignment at an undesirable location. The coefficient for undesirable location (UNLOCALE) is negative but is statistically insignificant at the 95% level of significance.

These estimation results are extremely revealing. They clearly indicate that non-white officers, male officers, older officers, non-academy graduates, and officers with Army specific skills intend to serve in the Army for a longer time period. The results also show that satisfaction with military life and chances of promotion are two major factors which influence intentions to serve in the Army. By increasing probabilities of promotion, policy makers can induce officers to serve in the Army for a longer period of time. With a given force structure, however, the opportunity for increasing promotion may be quite limited.

The second equation of the system identifies the factors which affect satisfaction with military life. Table 6 shows the parameter estimates for equation (2) which was estimated by using 2SLS estimation procedure. Estimation results show that satisfaction with military life depends on factors which affect both the officer directly and his/her family. All the coefficients have expected signs and all but five coefficients are statistically significant at the 95% level of significance; these five are significant at the 80% level of significance.

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TABLE 6: 2SLS ESTIMATES FOR THE SECOND EQUATION EXPLAINING MISAT

VARIABLE	DF	PARAMETERS	STD.ERROR	T VALUE	PROB > |T|
INTERCEPT	1	6.63619939*	0.26683316	24.870	0.0001
SERVYR	1	0.06365381*	0.00603771	10.543	0.0001
EMPS	1	0.08016369	0.04929207	1.626	0.1041
MORALE	1	0.06413106*	0.02077322	3.087	0.0020
EXMILIFE	1	0.21055552*	0.03103662	6.784	0.0001
FAMBET	1	-0.13634817*	0.026ᵣ177	-5.154	0.0001
RETBEN	1	0.05575104	0.02960426	1.883	0.0598
EDUCBEN	1	0.037789823	0.02737398	1.384	0.1664
MEDCARE	1	0.07206044*	0.02347126	3.070	0.0022
PRFREE	1	0.11085521*	0.02967721	3.735	0.0002
FRIEND	1	0.08937951*	0.03075613	2.906	0.0037
PAYALL	1	0.15743603*	0.03000974	5.246	0.0001
ENVFAM	1	0.07751318*	0.02985734	2.596	0.0095
FREQMV	1	0.09136283*	0.02603262	3.510	0.0005
CONTSV	1	0.12992455*	0.04077048	3.187	0.0015
JOBSAT	1	0.10364014*	0.02657129	3.900	0.0001
PROMOT	1	0. ʾ67774*	0.02499962	3.867	0.0001
JOBSEC	1	ʾ .00985*	0.02847809	1.967	0.0494
WKCOND	1	0.05142169	0.02832135	1.816	0.0696
SRECSV	1	0.06585282	0.05284129	1.246	0.2128
COMSERV	1	0.07714206*	0.02745402	2.810	0.0050

* t-statistic significant at the .05 level.

It is not surprising to find a significant positive relationship between the number of years an officer intends to serve in the Army (SERVYR) and satisfaction with the military life. For the officer, along with monetary factors, factors directly affecting the working environment are also important. Working conditions (WKCOND), coworkers and their friendship (FRIEND), morale of people in the current location (MORALE), personal freedom (PRFREE), job security (JOBSEC), and satisfaction with the current job (JOBSAT) have a significant positive influence on satisfaction. The officer obviously derives satisfaction from better pay and allowances (PAYALL). The officer is also concerned about his/her future. Chances of promotion (PROMOT) and retirement benefits (RETBEN) both positively and significantly influence satisfaction with the military life. The officer can acquire additional skills if good job training or educational programs (EDUCBEN) exist. The coefficient for this variable is positive and it is significant at the 80% level of significance.

Besides the factors discussed above, the satisfaction of the officer also depends on psychological factors and his/her perception of military and civilian life. The officers who feel that by serving in the Army they are serving their country are more satisfied because the coefficient for CONSTV is positive and statistically significant.

The officers whose perceptions of military life are realized tend to be more satisfied with their military life because the coefficient for EXMILIFE is significant at the 95% level of significance. If the officers feel that their family is likely to be better off if they were to serve in the civilian sector, then they are likely to be less satisfied with their military life. A significant coefficient for FAMBET (95% level of significance) shows this behavior clearly.

The recent literature on retention decisions of Army enlisted personnel (see Schwartz, 1987) emphasizes the fact that dissatisfaction of spouse with the available employment opportunities encourage them to quit their active duty. Similar results are obtained in this research. The officers with working spouses are more likely to be satisfied with Army life than those with non-working spouses. The coefficient for EMPS is significant at the 90% level of significance.

Finally, the estimation results show that satisfaction with medical facilities (MEDCARE), recreation services (SRECSV), commissary facilities (COMSERV), and a good environment for the family (ENVFAM) lead to increase in satisfaction with the military life. However, the frequent PCS moves (FREQMV) reduces satisfaction.[4] All coefficients except for SRECSV are significant at the 95% level of significance. This coefficient is significant at the 80% level of significance.

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[4]The variable FREQMV measures satisfaction/dissatisfaction with the frequency of moves. A smaller value of the variable shows dissatisfaction whereas the larger value shows satisfaction. Therefore, a positive coefficient for FREQMV implies that officers are satisfied with the smaller frequency of moves.

The two-equation model discussed thus far determines jointly the number of years officers intend to serve in the Army and their satisfaction with the military life. Estimates for the first equation indicate that satisfaction with the military life and chances of promotion are two major factors which influence the officers' decisions to serve in the Army. The estimates of the second equation show that along with the monetary benefits, a good working environment, a good environment for the family, retirement and medical benefits, educational facilities and employment opportunities for the spouse increase satisfaction with the military life.[5] All these factors indirectly influence the decisions of officers to serve in the Army.

In this research, the effect of spouse employment on the intended length of active service of officers is considered and estimated in the framework of a system of equations. Therefore, the parameter estimates are consistent. Employment opportunities for spouses affect retention decisions indirectly through their impact on satisfaction with the military life. To our knowledge, no other research work has developed a complete structural model with all the multi-disciplinary variables which are analyzed here.

4.4 A Comparison of 2SLS and 3SLS Estimates

It was argued in Section 4.2 that the 2SLS procedure gives consistent but inefficient parameter estimates. To improve the efficiency of parameter estimates, the model specified in equations (1) and (2) was re-estimated using 3SLS procedures. Tables 7 and 8 show the coefficients and the associated t-statistics obtained under 2SLS and 3SLS procedures. The magnitudes of most of the coefficients are not substantially changed under 3SLS procedure. As expected, there are some changes in the t-statistic. In equation (1), t-statistic for the AGE coefficient indicates that it is no longer statistically significant at the 95% level of significance. But coefficients for ROTCRG, NMOS and OVERSEAS become significant at the 95% level of significance. In equation (2), significance level declines for EMPS and JOBSEC, but increases for RETBEN and EDUCBEN. Since the parameter estimates do not substantially change under 3SLS procedure, subsequent analysis uses the 2SLS parameter estimates.

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[5]In the early stages of specifying equation (2), the following variables were also amongst the explanatory variables: housing, satisfaction with various family support programs - counseling services, chaplain services, youth/adolescent programs, child care, handicap or exceptional children, crisis referral service, alochol, drug, rape, legal, adjustment to higher cost of living, income of the spouse, and months of separation from spouse. The inclusion of these variables in the model did not improve the specification of the equation.

TABLE 7: PARAMETER ESTIMATES FOR FACTORS AFFECTING INTENTIONS TO SERVE
IN THE ARMY: A COMPARISON OF 2SLS WITH 3SLS ESTIMATES

VARIABLES	2SLS ESTIMATES (N = 1910)		3SLS ESTIMATES (N = 1910)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEPT	-2.96503182	-0.486	-4.36094793	-0.778
MISAT	1.37921795*	10.229	1.31747773*	9.849
LRMC	0.49819220	0.786	0.71263312	1.225
AGE	0.11162567*	2.286	0.05408160	1.210
RACE	-0.20744576	-0.636	-0.17027394	-0.570
YOS	0.32996415*	6.819	0.37278520*	8.355
SEX	-1.97174653*	-5.838	-1.38564896*	-4.445
OCCUP	-0.67572438*	-2.440	-0.67824665*	-2.673
ACGRAD	-0.01708367	-0.038	0.07150873	0.173
ROTCRG	0.42002308	1.312	0.64559398*	2.200
ROTCSC	0.47539045	1.259	0.54660639	1.581
DCIVIL	0.39702128	0.883	0.46706803	1.135
NMOS	0.40496887	1.517	0.47125782	1.928
YGUARD	-1.82195767*	-6.410	-1.63292497*	-6.259
PROM	0.76523852*	18.766	0.79151075*	20.375
OVERSEAS	0.00987147	1.611	0.01258006*	2.242
UNLOCALE	-0.02617269	-0.547	-0.06714933	-1.530

* t-statistic significant at the .05 level.

TABLE 8: PARAMETER ESTIMATES FOR FACTORS AFFECTING SATISFACTION WITH
MILITARY LIFE:: A COMPARISON OF 2SLS WITH 3SLS ESTIMATES

VARIABLES	2SLS ESTIMATES (N = 1910)		3SLS ESTIMATES (N = 1910)	
	PARAMETERS	T VALUES	PARAMETERS	T VALUES
INTERCEPT	6.63619939*	24.870	6.72519415*	26.528
SERVYR	0.06365381*	10.543	0.06042199*	10.115
EMPS	0.08016369	1.626	0.03776973	0.833
MORALE	0.06413106*	3.087	0.04131147*	2.169
EXMILIFE	0.21055552*	6.784	0.21407094*	7.499
FAMBET	-0.13634817*	-5.154	-0.16961977*	-6.955
RETBEN	0.05575104	1.883	0.07101895*	2.617
EDUCBEN	0.03789823	1.384	0.04621337	1.844
MEDCARE	0.07206044*	3.070	0.05422468*	2.522
PRFREE	0.11085521*	3.735	0.14696286*	5.390
FRIEND	0.08937951*	2.906	0.06878552*	2.444
PAYALL	0.15743603*	5.246	0.11555412*	4.201
ENVFAM	0.07751318*	2.59ó	0.07293529*	2.667
FREQMV	0.09136283*	3.510	0.10425203*	4.364
CONTSV	0.12992455*	3.187	0.18691490*	4.991
JOBSAT	0.10364014*	3.900	0.13017776*	5.337
PROMOT	0.09667774*	3.867	0.09030863*	3.912
JOBSEC	0.05600985*	1.967	0.01524882	0.584
WKCOND	0.05142169	1.816	0.06277861*	2.422
SRECSV	0.06585282	1.246	0.06213698	1.285
COMSERV	0.07714206*	2.810	0.04701422	1.871

* t-statistic significant at the .05 level.

4.5   Correction for Aggregation Bias

The results discussed so far may suffer from aggregation bias. It is conceivable that the factors which affect intentions to serve in the Army or satisfaction with the military life have different effects on different groups of officers. For example, the behavior of officers in combat arms may be different from the behavior of officers in non-combat arms, or the behavior of female officers may be different from that of male officers. To take account of such differences, the model specified in Section 4.1 is re-estimated for different groups of officers. Officers are distinguished on the basis of (a) Army specific skill or general skill, (b) sex, and (c) source of commission. The estimation results obtained under each of these criterion are discussed below.

4.5.1   Retention Intentions of Officers with Army Specific Versus General Skills

It is recognized in economic literature (see Antel, 1986 and Lakhani, 1988) that the effect of various factors on mobility of labor depends on whether labor has acquired firm specific or general skills. To analyze the effect of firm (Army) specific labor on intentions of officers to serve in the active force, officers are classified into different groups. This classification is based on the following two separate criteria.

(1)   It is hypothesized that scientifically trained officers (compared to other officers) can be more easily absorbed in the civilian sector and in that sense they are assumed to possess general skills.

(2)   It is hypothesized that officers in combat arms are imparted Army specific skills but officers in non-combat arms are not.

Under each hypothesis, the behavior of officers is compared and contrasted.

For this analysis, engineers, scientists and medical professionals are defined as scientifically trained officers. The variable OCCUP equals one for scientifically trained officers and is zero otherwise. The model specified in Section 4.1 is estimated (using 2SLS procedures) separately for scientifically trained and other officers. Tables 9 and 10 show the estimation results for the aggregate model and for scientifically trained and other officers respectively.

In the first equation, the coefficient for LRMC is strikingly different between the two groups of officers. It appears that monetary remunerations have insignificant effect on intentions of scientifically trained officers to serve in the Army but the same coefficient is significant at the 95% level of confidence for other officers. This result confirms the hypothesis that labor with firm specific skills is more responsive to monetary remuneration relative to labor with general skills. The average number of years that scientifically trained officers intend to serve in the Army is 17.84; for other officers this average is 20.15 years. The implied elasticity of the number of years intended to serve in the Army with respect to RMC is

TABLE 9: PARAMETER ESTIMATES FOR FACTORS AFFECTING INTENTIONS TO SERVE
IN THE ARMY: ALL OFFICERS VERSUS SCIENTIFICALLY TRAINED AND OTHERS

VARIABLES	ALL OFFICERS (N = 1910)		SC.TRAINED OFFICERS (N = 609)		OTHER OFFICERS (N = 1301)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T' VALUE
INTERCEPT	-2.96503182	-0.486	8.66219887	0.987	-17.96161566*	-2.081
MISAT	1.37921795*	10.229	1.22625138*	6.194	1.45363540*	8.242
LRMC	0.49819220	0.786	-0.84475062	-0.966	2.10584584*	2.307
AGE	0.11162567*	2.286	0.10432632	1.574	0.12411855	1.774
RACE	-0.20744576	-0.636	-0.18317687	-0.339	-0.22825373	-0.560
YOS	0.32996415*	6.819	0.43880834*	6.095	0.22386564*	3.308
SEX	-1.97174653*	-5.838	-1.54260592*	-3.300	-2.31047893*	-4.760
OCCUP	-0.67572438*	-2.440				
ACGRAD	-0.01708367	-0.038	-0.66601418	-0.787	-0.11305786	-0.206
ROTCRG	0.42002308	1.312	1.21735968*	2.239	-0.04984743	-0.123
ROTCSC	0.47539045	1.259	0.70155214	1.100	0.16816093	0.351
DCIVIL	0.39702128	0.883	1.04514813	1.867	-0.38259097	-0.511
NMOS	0.40496887	1.517	1.00146448	1.746	0.17559174	0.562
YGUARD	-1.82195767*	-6.410	-1.56824398*	-3.378	-1.88232674*	-5.229
PROM	0.76523852*	18.766	0.83700005*	13.281	0.72388455*	13.706
OVERSEAS	0.00987147	1.611	0.01114645	1.100	0.00821408	1.072
UNLOCALE	-0.02617269	-0.547	-0.06110613	-0.775	-0.00637447	-0.107

* t-statistic significant at the .05 level.

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TABLE 10: PARAMETER ESTIMATES FOR FACTORS AFFECTING SATISFACTION WITH MILITARY LIFE: ALL OFFICERS VERSUS SCIENTIFICALLY TRAINED AND OTHERS

VARIABLES	ALL OFFICERS (N = 1910)		SC. TRAINED OFFICERS (N = 609)		OTHER OFFICERS (N = 1301)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEPT	6.63619939*	24.870	7.39214653*	16.809	6.39627179*	18.278
SERVYR	0.06365381*	10.543	0.06273905*	6.735	0.06501749*	8.080
EMPS	0.08016369	1.626	0.11353248	1.281	0.06364634	1.064
MORALE	0.06413106*	3.087	0.05613658	1.588	0.06829019*	2.617
EXMILIFE	0.21055552*	6.784	0.16111780*	3.027	0.23570628*	6.143
FAMBET	-0.13634817*	-5.154	-0.16902194*	-3.544	-0.1110723*	-3.468
RETBEN	0.05575104	1.883	0.04494864	0.912	0.06963539	1.860
EDUCBEN	0.03789823	1.384	0.04063655	0.862	0.03633622	1.066
MEDCARE	0.07206044*	3.070	0.06972027	1.726	0.08084673*	2.766
PRFREE	0.11085521*	3.735	0.08883073	1.833	0.11435893*	3.024
FRIEND	0.08937951*	2.906	0.14208311*	2.652	0.074999785*	1.987
PAYALL	0.15743603*	5.246	0.21775412*	4.341	0.13017994*	3.445
ENVFAM	0.07751318*	2.596	0.13414386*	2.655	0.06317098	1.685
FREQMV	0.09136283*	3.510	0.11030830*	2.456	0.08474909*	2.637
CONTSV	0.12992455*	3.187	0.31026971*	4.549	0.04494822	0.879
JOBSAT	0.10364014*	3.900	0.15911667*	3.519	0.07922678*	2.372
PROMOT	0.09667774*	3.867	0.08382680*	2.028	0.10789095*	3.380
JOBSEC	0.05600985*	1.967	0.07223780	1.581	0.04877243	1.333
WKCOND	0.05142169	1.816	0.04739867	0.987	0.04266157	1.208
SRECSV	0.06585282	1.246	-0.08206664	-0.884	0.11697888	1.811
COMSERV	0.07714206*	2.810	0.08319628	1.727	0.07829230*	2.339

* t-statistic significant at the .05 level

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respectively -.047 and .104 for scientifically trained and other officers.[6] It should be noted that the coefficient for LRMC for scientifically trained officers is statistically insignificant.

The separation of officers by their training affects parameter estimates for YOS, SEX, source of commission and NMOS. The coefficient for YOS indicates that scientifically trained officers who have been in the active force for a longer time period intend to serve in the Army for a longer time period than other officers. The implied elasticity of SERVYR with respect to YOS for scientiffically trained and other officers are respectively .21 (= .4388 x 8.64 + 17.84) and .10 (= .2238 x 9.22 + 20.15). These elasticities imply that 1% increase in the years of service will result in twice as much increase in the intentions of scientifically trained officers to serve in the Army as compared to the other officers. Sex of officers has less influence on retention decisions of scientifically trained officers compared to that of other officers. The estimation results also show that academy graduates intend to serve for fewer years if they are scientifically trained.

The parameter estimates of the second equation also show the presence of aggregation bias. For non-scientifically trained officers, benefits such as medical care, retirement recreation, and commissary services significantly affect the satisfaction with the military life. Also, coefficients for MORALE and personal freedom (PRFREE) are statistically significant for non-scientist officers. The above-mentioned factors are not significant in determining the satisfaction of scientifically trained officers with military life. For these officers, family environment (ENVFAM) and patriotism (CONTSV) are significant factors; these two factors are not significant for other officers. The explanatory variables which are significant for both groups of officers are number of years intended to serve in the active service (SERVYR), perceptions about military life (EXMILIFE), expectations about the well being of the family in the civilian sector (FAMBET), friends and co-workers (FRIEND), satisfaction with pay and allowance (PAYALL), satisfaction with the frequency of moves (FREQMV), job satisfaction (JOBSAT) and chances of promotion (PROMOT). These estimation results clearly show that there are important differences in the behavior of scientifically trained officers and other officers. Such differences may provide useful guidence to policy makers as discussed in Section 5.

Other attempts to measure the hypothesis about mobility of firm specific labor were made by distinguishing officers who are in combat arms versus those who are not. It was hypothesized that the officers in combat arms are imparted Army specific skills. Tables 11 and 12 show the estimation results for combat arms and non-combat arms officers. As expected, estimation results

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[6]Controlling for other variables in equation (1) partial elasticity of SERVYR with respect to RMC is defined as: $e = (RMC/SERVYR)(\partial SERVYR/\partial RMC) = a_2/SERVYR$ where a_2 is coefficient for LRMC and SERVYR is average value of SERVYR.

Elasticity for scientifically trained officers = -.8447 / 17.84 = - .047.
Elasticity for other officers = 2.1058 / 20.15 = .104.

TABLE 11: PARAMETER ESTIMATES FOR FACTORS AFFECTING INTENTIONS TO SERVE IN THE ARMY: ALL OFFICERS VERSUS COMBAT ARMS AND NON COMBAT ARM OFFICERS

VARIABLE	ALL OFFICERS (N = 1910)		COMBAT ARM OFFICERS (N = 676)		NON COMBAT ARM OFFICERS (N = 1234)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEP	-2.96503182	-0.486	-37.49908142*	-2.908	8.08702823	1.152
MISAT	1.37921795*	10.229	1.68036612*	6.762	1.21589777*	7.643
LRMC	0.49819220	0.786	4.03683133*	2.933	-0.56515568	-0.784
AGE	0.11162567*	2.286	0.09567931	0.988	0.10819865	1.903
RACE	-0.20744576	-0.636	-0.00945137	-0.015	-0.34913587	-0.897
YOS	0.32996415*	6.819	0.13228439	1.477	0.41068596*	6.959
SEX	-1.97174653*	-5.838	-1.67081187	-1.349	-2.01114552*	-5.634
OCCUP	-0.67572438*	-2.440	-0.43968099	-0.688	-0.69898937*	-2.239
ACGRAD	-0.01708367	-0.038	-0.17963708	-0.265	-0.33896323	-0.514
RCTCRG	0.42002308	1.312	0.02963147	0.051	0.39838333	1.016
ROTCSC	0.47539045	1.259	0.08729640	0.130	0.45249836	0.970
DCIVIL	0.39702128	0.883	-0.00614300	-0.004	0.42127207	0.868
NMOS	0.40496887	1.517				
YGUARD	-1.82195767*	-6.410	-1.87607036*	-3.848	-1.68105502*	-4.773
PROM	0.76523852*	18.766	0.68515808*	9.093	0.80414209*	16.453
OVERSEAS	0.00987147	1.611	0.01083208	1.038	0.00726932	0.945
UNLOCALE	-0.02617269	-0.547	-0.00265944	-0.033	-0.03726671	-0.624

* t-statistic significant at the .05 level.

TABLE 12: PARAMETER ESTIMATES FOR FACTORS AFFECTING SATISFACTION WITH MILITARY LIFE:
ALL OFFICERS VERSUS COMBAT ARMS AND NON COMBAT ARM OFFICERS

VARIABLES	ALL OFFICERS (N = 1910)		COMBAT ARM OFFICERS (N = 676)		NON COMBAT ARM OFFICERS (N = 1234)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEPT	6.63619939*	24.870	6.14460537*	11.426	6.95403097*	22.070
SERVYR	0.06365381*	10.543	0.06848982*	5.503	0.06097879*	8.613
EMPS	0.08016369	1.626	0.10299676	1.250	0.05776044	0.919
MORALE	0.06413106*	3.087	0.06632707	1.722	0.05862778*	2.340
EXMILIFE	0.21055552*	6.784	0.22246953*	3.939	0.21365323*	5.711
FAMBET	-0.13634817*	-5.154	-0.08936431*	-1.965	-0.16651016*	-5.051
RETBEN	0.05575104	1.883	0.03099048	0.622	0.07319230	1.959
EDUCBEN	0.03789823	1.384	0.06811870	1.392	0.02546441	0.766
MEDCARE	0.07206044*	3.070	0.05651627	1.337	0.08259043*	2.895
PRFREE	0.11085521*	3.735	0.06956391	1.276	0.12937478*	3.645
FRIEND	0.08937951*	2.906	0.04291648	0.812	0.12197299*	3.188
PAYALL	0.15743603*	5.246	0.16446685*	3.235	0.14335868*	3.799
ENVFAM	0.07751318*	2.596	0.09245611	1.697	0.07210030*	1.987
FREQMV	0.09136283*	3.510	0.10307258*	2.238	0.08908173*	2.808
CONTSV	0.12992455*	3.187	0.03281947	0.453	0.18018186*	3.632
JOBSAT	0.10364014*	3.900	0.13414104*	2.846	0.09156227*	2.818
PROMOT	0.09667774*	3.867	0.07900669	1.769	0.11086220*	3.637
JOBSEC	0.05600985*	1.967	-0.01771342	-0.331	0.09361098*	2.761
WKCOND	0.05142169	1.816	0.04348346	0.856	0.04568461	1.328
SRECSV	0.06585282	1.246	0.12544465	1.330	0.03730317	0.577
COMSERV	0.07714206*	2.810	0.06367267	1.275	0.08609928*	2.588

* t-statistic significant at the .05 level

show that intentions of combat arm officers to serve in the Army are more responsive to monetary compensation (RMC) than for non-combat arm officers. The elasticity of the number of years intended to serve with respect to RMC is respectively .19 (= 4.036 + 20.81) and -.03 (=-.565 + 18.64) for combat arms and non-combat arms officers. It should be noted that the coefficient for LRMC for non-combat arms officers is not statistically significant. On the average officers in combat arms intend to serve in the active force for 20.8 years whereas officers in non-combat arms intend to serve for only 18.6 years. The elasticity of SERVYR with respect to YOS is .06 (= .1322 x 9.75+ 20.81) for combat arm officers and .19 (= .4106 x 8.64 + 18.64) for non-combat officers. The coefficient for YOS is not statistically significant for combat arm officers. These elasticities imply that the years of service do not affect the intentions of combat arm officers to serve in the Army but they do positively influence the intentions of non-combat arms officers. A 1% increase in the years of service increases the years of expected services by .19% for non-combat arm officers.

Parameter estimates for factors determining satisfaction with the military life show considerable difference in the behavior of combat and non-combat arms officers. The coefficients for various facilities and benefits (RETBEN, MEDCARE, ENVFAM, COMSERV, PROMOT, JOBSEC, CONTSV, PRFREE and MORALE) are statistically significant for non-combat arms officers, but not for officers in combat arms. The behavior of officers implied by these parameter estimates again points to the possibility that facilities and benefits other than monetary remuneration are more important for officers in non-combat arms, but for officers in combat arms monetary remunerations are more important. The estimation results also show that recreation facilities are more important for officers in combat arms than in non-combat arms.

The two classifications of officers on the basis of Army specific or general skills reveal the same two major conclusions:

(1) Army specific labor is more responsive to monetary compensation than other labor.

(2) Facilities and benefits available in the active service influence the satisfaction of officers with general skills more than other officers.

These two findings have major policy implications. Such results were concealed in the aggregate estimation of the model in Section 4.3.

4.5.2   Retention Intentions of Male Officers Versus Female Officers

The differences in the behavior of male and female officers are not revealed in the aggregate model. The model specified in Section 4.1 was estimated separately for male and female officers. Tables 13 and 14 show these estimation results. The estimates for the first equation show striking differences in the coefficient of LRMC between male and female officers. However, these coefficients are not statistically significant. The male officers are far less responsive than female officers to monetary remuneration

TABLE 13: PARAMETER ESTIMATES FOR FACTORS AFFECTING INTENTIONS TO SERVE IN THE ARMY:

ALL OFFICERS VERSUS MALE AND FEMALE OFFICERS

VARIABLES	ALL OFFICERS (N = 1910)		MALE OFFICERS (N = 1516)		FEMALE OFFICERS (N = 394)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEPT	-2.96503182	-0.486	-0.18336599	-0.026	-25.95900720*	-2.173
MISAT	1.37921795*	10.229	1.54649027*	9.471	0.86434783*	3.785
LRMC	0.49819220	0.786	0.09716521	0.130	1.97256037	1.572
AGE	0.11162567*	2.286	0.09008765	1.532	0.21800309*	2.311
RACE	-0.20744576	-0.636	-0.52471072	-1.367	0.78265443	1.241
YOS	0.32996415*	6.819	0.33494487*	5.988	0.34788525*	3.356
SEX	-1.97174653*	-5.838				
OCCUP	-0.67572438*	-2.440	-0.74376898*	-2.285	-0.32519455	-0.581
ACGRAD	-0.01708367	-0.038	0.00548950	0.012	0.92004275	0.594
ROTCRG	0.42002308	1.312	0.45558809	1.301	0.97863900	1.082
ROTCSC	0.47539045	1.259	0.59211461	1.425	0.68397706	0.693
DCIVIL	0.39702128	0.883	0.40798231	0.640	0.43398557	0.628
NMOS	0.40496887	1.517	0.33546393	1.203	1.22402982	1.050
YGUARD	-1.82195767*	-6.410	-1.80942460*	-5.438	-1.67048088*	-2.992
PROM	0.76523852*	18.766	0.69253098*	14.576	0.99718479*	11.874
OVERSEAS	0.00987147	1.611	0.00989720	1.475	0.00725164	0.463
UNLOCALE	-0.02617269	-0.547	-0.02668652	-0.494	0.08071959	0.741

* t-statistic significant at the .05 level.

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TABLE 14: PARAMETER ESTIMATES FOR FACTORS AFFECTING SATISFACTION WITH MILITARY LIFE:
ALL OFFICERS VERSUS MALE AND FEMALE OFFICERS

VARIABLES	ALL OFFICERS (N = 1910)		MALE OFFICERS (N = 1516)		FEMALE OFFICERS (N = 394)	
	PARAMETERS	T VALUE	PARAMETERS	T VALUE	PARAMETERS	T VALUE
INTERCEPT	6.63619939*	24.870	6.03797726*	18.093	7.3618117*	15.813
SERVYR	0.06365381*	10.543	0.08450192*	10.548	0.04382156*	4.378
EMPS	0.08016369	1.626	0.01808308	0.327	0.06109095	0.430
MORALE	0.06413106*	3.087	0.07555411*	3.135	0.06049185	1.464
EXMILIFE	0.21055552*	6.784	0.16939554*	4.640	0.30109362*	5.297
FAMBET	-0.13634817*	-5.154	-0.05992840	-1.891	-0.27781451*	-5.426
RETBEN	0.05575104	1.883	0.07277321*	2.140	0.01039504	0.173
EDUCBEN	0.03789823	1.384	0.02887081	0.913	-0.001141254	-0.021
MEDCARE	0.07206044*	3.070	0.06463718*	2.380	0.07070392	1.507
PRFREE	0.11085521*	3.735	0.08902443*	2.506	0.17750626*	3.453
FRIEND	0.08937951*	2.906	0.06511715	1.789	0.17721912*	3.174
PAYALL	0.15743603*	5.246	0.16058259*	4.663	0.09100041	1.479
ENVFAM	0.07751318*	2.596	0.10610740*	3.043	-0.01733718	-0.306
FREQMV	0.09136283*	3.510	0.10014935*	3.330	0.01999200	0.376
CONTSV	0.12992455*	3.187	0.11956645*	2.521	0.16210701*	2.110
JOBSAT	0.10364014*	3.900	0.07684719*	2.502	0.17808752*	3.314
PROMOT	0.09667774*	3.867	0.10348924*	3.569	0.08561137	1.736
JOBSEC	0.05600985*	1.967	0.05049085	1.519	0.15798370*	2.887
WKCOND	0.05142169	1.816	0.02365813	0.714	0.12406647*	2.356
SRECSV	0.06585282	1.246	0.10988038	1.765	-0.01686452	-0.175
COMSERV	0.07714206*	2.810	0.06626719*	2.050	0.13316032*	2.607

* t-statistic significant at the .05 level

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in their decisions about the number of years to serve in the active force. The implied elasticity for the number of expected years of service with respect to RMC is respectively .005 (= .0972 + 20.40) and .13 (= 1.97+ 15.61) for male and female officers.

Another important difference in the behavior of male and female officers is seen in the difference in the coefficient for OCCUP. The analysis suggests that scientifically trained male officers intend to serve in the Army for fewer years relative to non-scientifically trained male officers.

The estimation results of the second equation show very distinct differences in the factors which affect satisfaction of male and female officers with the military life. The coefficients for morale (MORALE), retirement benefits (RETBEN), medical facilities (MEDCARE), satisfaction with pay and allowance (PAYALL), environment for the family (ENVFAM), frequency of moves (FREQMV) and chances of promotion (PROMOT) are all statistically significant at the 95% level of significance for male officers, but are not so for female officers. The female officers are more concerned about working conditions, friends at the work place and job security. The satisfaction of female officers with the military life also declines more significantly if they feel that the family will be better off in the civilian sector. While none of these findings are really surprising, they could not be brought to light without correcting for aggregation bias.

4.5.3   Influence of Source of Commission on the Retention Intentions of Officers

Officers are commissioned into active duty through various programs. The major sources of commission are (a) through military academy, (b) ROTC scholarship programs, (c) ROTC regular programs, (d) direct hires from the civilian labor force, and (e) various other miscellaneous programs. The costs of hiring an officer depends upon their source of commission. The cost of training an officer through the military academy are the highest, followed by ROTC scholarship and regular programs. The Army incurs lower costs if officers are hired directly from the civilian labor force. Army managers would like to reap the benefits of their costs incurred in training officials. The results presented earlier in this report show that academy graduates intend to stay in the Army for fewer years as compared with other officers. These results are rather disturbing. To better understand the behavior of officers, separate models are estimated for the following groups:

(a) officers who are academy graduates,
(b) officers hired through ROTC regular programs,
(c) officers hired through ROTC scholarship programs, and
(d) officers hired directly from the civilian labor force.

Tables 15 and 16 show the estimation results.

The estimation results for the first equation are very revealing. For each group of officers the coefficients for MISAT and PROM are positive and significant at the 95% level of significance. The coefficients for LRMC are

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TABLE 15: PARAMETER ESTIMATES FOR FACTORS AFFECTING INTENTIONS TO SERVE IN
THE ARMY: A COMPARISON OF MAJOR RECRUITMENT PROGRAMS

VAR.	ACCADEMY GRADUATES (N = 209)		ROTC REG. OFFICERS (N =643)		ROTC SC. OFFICERS (N =372)		APT. FROM CIVIL. (N = 228)	
	COEFF.	T VAL.	COEFF.	T VAL.	COEFF.	T VAL	COEFF.	T VAL.
INT.	-141.17*	-3.595	-20.1948	-1.599	-30.25470*	-2.041	-6.62621	-0.517
MISAT	1.47559*	3.125	1.2933*	6.010	1.12294*	3.705	1.07617*	3.415
LRMC	14.55528*	3.515	2.9723*	2.218	3.38615*	2.112	0.77000	0.617
AGE	-0.16336	-0.467	-0.0108	-0.107	0.06788	0.325	0.08705	0.965
RACE	1.54831	0.986	-0.4545	-0.907	0.85268	1.012	-0.06587	-0.079
YOS	0.13913	0.398	0.1928	1.800	0.28331	1.477	0.44901*	4.155
OCCUP	-1.91576	-1.707	0.0205	0.043	-0.73216	-1.123	0.45457	0.613
SEX	0.22095	0.125	-3.0688*	-4.762	-2.12687*	-2.597	-1.31287	-1.833
NMOS	0.48558	0.523	0.2148	0.513	0.24749	0.430	0.93318	0.780
YGUARD	-0.81590	-0.870	-2.0904*	-4.494	-2.59616*	-4.148	-1.42681	-1.869
PROM	0.94020*	5.663	0.7373*	10.679	1.03384*	10.336	0.83791*	7.599
OVERSEAS	0.01429	0.677	0.0116	1.116	-0.004450	-0.274	0.01474	0.845
UNLOCALE	-0.10912	-0.696	-0.0625	-0.816	-0.15533	-1.323	-0.02829	-0.214

* t-statistic significant at the .05 level.

TABLE 16: PARAMETER ESTIMATES FOR FACTORS AFFECTING SATISFACTION WITH MILITARY LIFE: A COMPARISON OF MAJOR RECRUITMENT PROGRAMS

VAR.	ACCADEMY GRADUATES (N = 209)		ROTC REG. OFFICERS (N = 643)		ROTC SC. OFFICERS (N =372)		APT. FROM CIVIL. (N = 228)	
	COEFF.	T VAL.	COEFF.	T VAL.	COEFF.	T VAL.	COEFF.	T VAL.
INT.	6.11681*	7.488	7.533414*	16.350	6.799152*	10.989	6.632013*	8.590
SERVYR	0.06056*	3.937	0.057939*	5.546	(.068661*	5.969	0.056209*	3.314
EMPS	0.26054	1.875	-0.0002059	-0.003	0.092345	0.778	0.178585	1.005
MORALE	0.06161	1.004	0.021008	0.641	0.056135	1.048	0.065757	0.996
EXMILIFE	0.30532*	3.422	0.244105*	5.105	0.182973*	2.457	0.188566*	1.993
FAMBET	-0.25872*	-3.306	-0.104636*	-2.515	-0.007829	-0.124	-0.292473*	-3.226
RETBEN	0.18074*	2.308	0.063577	1.410	-0.075165	-1.044	0.061355	0.621
EDUCBEN	0.14271	1.935	0.0054285	0.123	0.056008	0.863	0.113312	1.275
MEDCARE	-0.04083	-0.655	0.112355*	3.044	0.037830	0.696	0.145852	1.830
PRFREE	0.02823	0.339	0.195474*	4.127	0.119149	1.652	0.051232	0.503
FRIEND	-0.04312	-0.485	0.105858*	2.201	0.130385	1.891	0.124087	1.184
PAYALL	0.12843	1.579	0.207444*	4.407	0.183034*	2.458	0.075760	0.710
ENVFAM	0.15243	1.877	0.014534	0.290	0.192818*	2.780	0.068111	0.613
FREQMV	0.05415	0.726	0.085544*	2.014	0.083457	1.302	0.025136	0.293
CONTSV	0.21206	1.705	0.103002	1.663	0.009697	0.094	0.260666*	2.068
JOBSAT	0.06572	0.890	0.065276	1.511	0.202065*	3.398	0.135986	1.425
PROMOT	0.05329	0.829	0.130456*	3.037	0.042212	0.694	0.076491	0.904
JOBSEC	0.03875	0.406	0.045095	0.968	0.095010	1.306	0.197320*	2.411
WKCOND	0.06199	0.779	0.067517	1.502	0.027456	0.409	0.011736	0.127
SRECSV	0.13988	0.924	-0.078401	-0.931	0.266110*	2.138	-0.043525	-0.264
COMSERV	0.02242	0.295	0.088653*	2.045	0.125498	1.895	0.061507	0.752

very instructive. These coefficients are significant at the 95% level of significance for all officers except for those who are hired directly from the civilian labor force. This means that the monetary compensation has a significant role to play in the officers decisions to serve in the Army. Due to aggregation bias, the importance of this variable was not observed in the aggregate model. It is further interesting to note that the effect of monetary compensation on the length of intentions to serve in the Army depends on the source of commission. The elasticity of SERVYR with respect to RMC is respectively .74, .15, .18 and .04 for academy graduates, ROTC regular officers, ROTC scholarship officers, and direct hires from the civilian labor force.[7] These results have very important policy implications. They suggest that if academy graduates are to be induced to serve longer terms in the Army they must be compensated more in monetary terms for their services.

In the aggregate model, the coefficients for AGE, SEX, YOS and OCCUP were significant at the 95% level of significance, but in the disaggregate models these coefficients are not significant. In each of the disaggregate categories, officers intend to join the National Guard or Reserve Force, but this variable is significant only for the officers hired through ROTC programs. Again, the coefficient for SEX suggests that male officers intend to serve for a longer time period if they were hired through ROTC programs. The differences in coefficients of other variables are not very important for policy implications and hence are not discussed.

Table 16 shows the estimation results for the second equation for each of the four groups of officers. These results show how different the factors are in each group which influence the satisfaction of officers with the military life. The number of years expected to serve in the Army (SERVYR) and realization of perceptions about the military life (EXMILIFE) are the only two factors which are significant at the 95% level of significance for each group of officers.

Employment status of spouse is a significant determinant of satisfaction of academy graduate officer only. This coefficient is significant at the 90% level of significance. Other factors which significantly affect satisfaction of academy graduates are retirement benefits, educational benefits and environment for the family. If these officers believe that their families will be better off in the civilian sector, they tend to be less satisfied with the military life.

A different set of variables has a significant effect on satisfaction of officers hired through ROTC regular programs. The satisfaction of these officers is significantly affected by pay and allowances the working environment (PRFREE and FRIEND), medical facilities, commissary services, and chances

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[7]These elasticitics are computed as follows:

ACGRAD:	14.55 - 19.655 =	.74
ROTCRG:	2.97 - 20.278 =	.15
ROTCSC:	3.39 - 19.540 =	.18
DCIVIL:	.77 - 17.320 =	.04

of promotion. These officers also believe that they will be less satisfied if their families are likely to be better off in the civilian sector.

The officers hired under ROTC scholarship programs believe that pay and allowances, friends at work, good environment for the family, job satisfaction and good recreation services have a significant influence on satisfaction with their military lives. For the officers hired directly from the civilian sector, job security and chance to serve the country are important factors. However, these officers believe that they will be less satisfied if their families could be better off in the civilian sector.

An analysis of officers by their source of commission clearly indicates that there are major differences in the behavior of officers; the factors which affect their satisfaction are different and their responses to monetary remunerations are different. In the aggregate analysis these differences could not be revealed. Correction for aggregation bias provides very useful tools for policy makers. Policy implications of these results are discussed in Section 5.

5.0 DISCUSSION

5.1 Major Findings

In this research, major factors which affect intentions of junior Army officers, to quit or stay in the active force, are identified. These factors are demographic, economic, social and psychological. The impact of each of these factors on the decision making process of the officers is assessed in a system of two equations. It is hypothesized that the number of years an officer intends to serve in the Army and his satisfaction with the military life are jointly determined. In the first equation, the number of years an officer intends to serve in the Army is estimated as a function of satisfaction with military life, monetary compensation, age, race, sex, promotion potential, length of service, source of commission, probability of transfer to an undesirable location and the time spent overseas. In the second equation, satisfaction of an officer with the military life is estimated as a function of his perception of military life, morale of military personnel at current location, opportunity to serve the country, working conditions, training and education facilities, job security, chance of promotion, retirement benefits, pay and allowances, employment status of the spouse, medical and recreation facilities, frequency of moves, commissary services and the general environment for the family.

The parameter estimates for the first equation show that the two most important factors which affect intentions of officers to serve in the Army are satisfaction with their military life and chances of promotion. The regular monetary compensation affects their decisions in a positive though indirect way, via their satisfaction with the military life. The estimation results imply that officers in combat arms who intend to serve in the Army for a longer time period include non-white officers, male officers, older officers, officers with longer services, non-academy graduates and officers with Army specific skills. After quitting the active force the officers also intend to join National Guard or Reserve Force.

The parameter estimates for the second equation on satisfaction with the military life show that the officers are satisfied with their military life if their positive perceptions about the military life are realized and if they intend to serve for a long time period. Also important for an officer, along with monetary factors, retirement benefits and chances of promotion are factors directly affecting the working environment. Working conditions, satisfaction with co-workers and their friendship, unit morale, personal freedom, job security, training facilities and satisfaction with the current job have a significant positive influence on satisfaction with the military life. The other factors which affect the family and thus influence the satisfaction with the military life are employment status of the spouse, medical and recreation facilities, commissary services and environment for the family.

The correction for aggregation bias further enhances the understanding of the retention decision making process of the officers. Separate equations are estimated for (a) officers with Army specific skills versus those with

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general skills, (b) male officers versus female officers, and (c) officers commissioned under different programs. Significant differences in the behavior of different groups of officers are observed.

Two selection criteria are used to distinguish officers with Army specific skills from those with general skills. First, the officers with scientific training, such as, in engineering, science, and medical, are classified as general skill officers. Second, the officers in non-combat arms are classified as general skill officers. The analysis of officers under each of these two criteria led to the following two conclusions:

(1) Firm or Army specific labor is more responsive to monetary compensation than the labor with skills transferable to civilian sector.

(2) Facilities and benefits available in the active service influence the satisfaction of officers with general skills more than those with Army specific skills.

The behavior of male officers differs from those of female officers. The implied elasticity for the number of years intended to serve with respect to RMC is significantly higher for female officers than for male officers, perhaps because female officers are still being discrimated against in the civilian labor market and hence cannot command competetive salaries outside the Army. Also, the factors which affect satisfaction with military life are different for the two groups. The male officers are concerned about their retirement benefits, chances of promotion and educational and medical benefits but the female officers are more affected by their working conditions, friends at work and job security.

To avoid aggregation bias, separate equations are estimated for officers commissioned under four major programs. The parameter estimates show that elasticity of the number of years an officer intends to serve in the Army with respect to monetary remuneration varies across source of commission. It is the highest for academy graduates (.74) and the lowest for officers directly hired from the civilian sector (.04). Hence while a one percent increase in RMC increases the years of service of academy graduates by 0.74 percent, an equivalent increase in RMC increases the years of service supplied by a directly hired officer by only 0.04 percent. The significance of various factors on satisfaction with the military life also depends upon how an officer is commissioned. The retirement and educational benefits, environment for the family and employment status of the spouse are important determinants of satisfaction for an academy graduate officer. The officers hired through ROTC regular programs believe that their satisfaction is significantly affected by the working environment, medical facilities, commissary services, chances of promotion and pay and allowances. The officers hired under ROTC scholarship programs believe that pay and allowances, friends at work, good environment for the family, job satisfaction and good recreation services have a significant influence on satisfaction with their military lives. For the officers hired directly from the civilian sector, job security and chance to serve the country are important factors. The correction for aggregation bias shows the significance of different factors for the several groups of officers. These results have very important policy implications.

5.2 Policy Implications

The results of this research can be used to guide policies to maintain a targeted strength of junior officers or to achieve a desired mix of officers. The parameter estimates for the first equation clearly show that satisfaction with the military life and promotion opportunities are the two major factors which influence the intentions of the officers to serve in the Army. By increasing probabilities of promotion, policy makers can induce officers to serve in the Army for a longer period of time. With a given force structure, however, the opportunity for increasing promotion may be quite limited. Alternatively, the policy makers can provide facilities or other benefits which increase satisfaction with the military life and thereby induce the officers to serve in the active force for a longer time period. Factors positively affecting retention are good retirement and medical benefits, in-service job training and education opportunities, recreation facilities, commissary services, good environment at work and for the family. A reduction in the frequency of PCS moves will also help to increase satisfaction with the military life.

The correction for aggregation bias showed that the response of different groups of officers is different for alternative policy variables. As discussed below, these varied responses have important policy implications, especially in directing policies to achieve a desired mix of officers.

The estimation results show that the officers with firm specific skills are more responsive to monetary remuneration whereas those possessing general skills are more responsive to other benefits and facilities. If the objectives of the Army managers is to retain or increase the number of officers in combat arms or officers with non scientific training, the policy makers should increase monetary remuneration. Alternatively, if the Army objective is to increase or maintain the strength of officers with scientific training, the appropriate Army policies would be to provide good medical benefits, an improved working environment, a healthy environment for the family, better commissary services along with reducing frequency of PCS moves.

The behavior of female officers differs from those of male. The female officers can be induced to serve for a longer time period through higher monetary remuneration, improved job security and good working conditions. The decision of male officers are guided more by retirement and medical benefits, education facilities and promotion potential.

The retention behavior of officers varies across major source of commissioning. These differences have important policy implications because the cost of recruiting an academy graduate officer is much higher than recruiting him/her directly from the civilian labor force. The Army invests large sums of money in training officers in the military academy and these investments can be capitalized by minimizing the attrition rates of academy trained graduates. The estimation results show that the academy graduates intend to serve in the Army for fewer years as compared to the non-academy officers. Therefore, it is extremely important to develop policies which induce these officers to serve for a long period of time. The estimation results in Table 15 imply that a 10% increase in regular military compensation increases

intentions to serve in the active force by 7.4%. In other words, on average, a West Point trained officer can be induced to serve for one additional year by increasing his/her annual remuneration by approximately $1,685. These estimated costs of retaining a West Point graduate for one additional year are extremely low compared to the annualized cost of training him/her at $11,450.[8] Therefore, it is cost effective to retain the academy trained officers. They can be induced to serve for a longer time by increasing RMC through relatively quicker promotions. The other factors which influence their decisions are retirement benefits, education facilities and employment status of spouses. The policies to encourage retention of officers who were recruited under other programs such as ROTC or direct hires from the civilian sector must be tailored differently. For example, officers hired directly through the civilian sector, are more motivated by job security to serve for a longer time period.

5.3 Limitations of the Research

This research is based on the data collected under the DoD Survey of Officers and Enlisted Personnel, 1985. In this survey data, officers expressed their intentions about serving in the active force. Therefore, all the results and analysis are based on the intentions of the officers and not on their actual behavior. It is not known to what extent these intentions are realized. It is also likely that with the passage of time, officers change their intentions. For a more meaningful analysis of retention decisions of officers, their actual behavior should be analyzed. Such analyses require data from sources other than the source used in this analysis. A possible source is the Officer Master File. It will be interesting to compare the retention intentions of the officers in the DoD 85 survey with the actual turnover of these officers available in the 1985, 1986, 1987 or 1988 Officer Master Files.

Some other limitations arise from the design of the survey. A few such limitations are described below:

(1) The officers were asked about their chance of promotion to the next pay grade. Amongst the various responses to this question, the officers could choose the response, "I plan to leave the service." Such responses make it difficult to distinguish the officers

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[8]The computations cited are explained as follows:

Average number of SERVYR = 19.65. One year of 19.65 = 5.09%. To increase SERVYR by 7.4%, 10% increase in RMC is required, therefore, to increase SERVYR by 5.09% (one year), RMC should be increased by 6.88% = $1,685 (since average annual RMC = 24,500).

Schemmer ( ) estimated that the cost of training one West Point graduate = $225,000. Therefore, the annualized cost of a West Point graduate = $225,000 ÷ 19.65 = $11,450. All the computations are in terms of 1985 dollars.

who intend to leave the service because of low chances of promotion or inspite of good chances of promotion. Such distinctions are very important in correctly assessing the effect of chance of promotion on retention decisions. It would be also desirable to estimate the average speed of promotion, by pay grade, or by MOS, and determine the effect on retention of officers whose speed of promotion was faster than the average speed.

(2) The estimation results show that employement status of spouses influence retention decisions of officers. The officers with unemployed spouses intend to serve for fewer years. In the database there is no distinction between spouses who do not wish to work and those who are unemployed. Also, there is no way to determine how may of the working spouses are under-employed. Such problems in the database can bias the estimation results.

(3) In the survey, responses to most of the questions are qualitative in nature. Such data limit the usefulness of the analysis. It becomes difficult to model and analyze the effect of changes in policy variables. The researchers can only say that good retirement benefits induce officers to serve in the Army for a longer time period but they cannot infer that if the retirement benefits improve by a certain percentage, the officers will increase their service by a certain number of years.

Finally, a preliminary analysis of the data showed that there are some inconsistencies in the database. For example, in some cases it was observed that the spouse earned military income even though no work was done during the year. Such inconsistencies should be removed by obtaining additional information from such other databases as the Joint Uniform Military Pay System (JUMPS) which provide military members pay. As regards the earnings of non-military spouses, it is suggested that a future survey should solicit their social security numbers so that their earnings data could be obtained from the Social Security Administration or the Internal Revenue Service.

5.4 Recommendations for Future Research

This research analyzes intentions of the junior officers to serve in the Army. A better understanding of the factors which in fact drive the decision process of officers will be achieved if the actual behavior of the officers is analyzed. To conduct such a research, a longitudinal database is required which traces the mobility of the same officers over a period of time. Such a database could perhaps be constructed using information from the Officer Master File and merging it with data from the Social Security Administration, for those who separate from the Army. It would also be useful to see what kind of alternatives exist in the civilian life for the officers who quit the Army. Such insights can be gained by analyzing the behavior of civilian labor force with backgrounds similar to those of junior Army officers.

This research showed that some officers intend to join National Guard and Reserve Force after quiting the active force. Since the Congress is emphasizing the importance of maintaining a large pool of National Guards and Reserve Force officers, it might be interesting to analyze what type of benefits attract the officers to such services and what are the factors which are responsible for the attrition of officers from the National Guard and Reserve Forces.

Finally, this research analyzed the behavior of only junior Army officers. The issues which affect the attrition of enlisted personnel and Army civilians may be very different from those of junior Army officers. A similar analysis can be performed to understand the decision making process of enlisted personnel and Army civilians.

APPENDIX A

A MAPPING OF VARIABLES TO SAS VARIABLES

Variable Name	Corresponding SAS Variable (1985 DoD survey data)
ACGRAD	O1 0 .
AGE	O36E35
COMSERV*	O1 091 05P
CONTSV*	O1 091 05I
DCIVIL	O1 0
EDUCBEN*	O1 091 05L
EMPS	O97E93N
ENVFAM*	O1 091 05F
EXMILIFE*	O1 08 104A
FAMBET*	O1 08 104D
FREQMV*	O1 091 05G
FRIEND*	O1 091 05B
JOBSAT*	O1 091 05J
JOBSEC*	O1 091 05M
MEDCARE*	O1 091 05P
MISAT	O11 0E1 06
MORALE	O1 07E1 03
NMOS	O7E7
OCCUP	OOCC1
OVERSEAS	O1 6E1 5
PAYALL*	O1 091 05E
PRFREE*	O1 091 05A
PROM	O32
PROMOT*	O1 091 05K
RACE	RACE4
RETBEN*	O1 091 05H
RMC	WAGES+BAS+BAQ+VHA
ROTCRG	O1 0
ROTCSC	O1 0
SERVYR	O27E26
SEX	O35E34
SRECSV	O89E85OO
UNLOCALE	O30E29
WKCOND*	O1 091 05N
YGUARD	O29
YOS	O6E6

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*In order to clearly interpret the coefficients for these variables, the values in the database were multiplied by negative one.

APPENDIX B

CODES FOR MOS OFFICERS

The officers with MOS (ALPHA) codes 11, 11A, 11B, 11C, 12, 12A, 12B, 12C, 13, 13A, 13B, 13C, 13D, 13E, 14, 14A, 14B, 14C, 14D, 14E, 15, 15A, 15B, 15C, 15M, 15S, 15T, 16 and 55 are classified as officers in combat arms. Specifically the following codes are included:

In the category of 11

++11, +11A, +11C, 0011, 011A, 011B, 011C, 11, 11A, 11AA, 11AC, 11AO, 11A0, 11A5, 11B, 11BO, 11BP, 11B0, 11B5, 11C, 11CA, 11C0, 11C5, 11C, 11CA, 11C0, 11C5, 1100, 1100, 1115, 1118, 1123, 1131, 1135, 1136, 1141, 1142, 1143, 1145, 1146, 1148, 1149, 1151, 1152, 1154, 1174, 1191, 1192, 1195, 1197, 115P, 1155.

In the category of 12

0012, 012A, 012B, 012C, 12, 12BO 12B0, 12B3, 12C, 12C0, 120A, 1200, 1203, 1222, 1223, 1227, 1231, 1235, 1241, 1242, 1245, 1246, 1248, 1249, 1251, 1253, 1254, 1291, 1292, 1297.

In the category of 13

++13, +13A, 0013, 013, 013A, 013B, 013C, 013E, 0130, 13, 13A, 13AB, 13AC, 13AE, 13AO, 13A1, 13A5, 13A9, 13B, 13CA, 13CE, 1300, 13C0, 13D, 13DE, 13D0, 13EF, 13EO, 13EP, 13E0, 1300, 1323, 1325,

1335, 1336, 1341, 1342, 1351, 1352, 1353, 1354, 135P, 1373, 1391,

1392, 1395, 1397.

In the category of 14

+14A, +14B, +14D, 0014, 014A, 014C, 014D, 14A, 14A0, 14B, 14B0,

14D, 14DG, 14D0, 14E, 1400, 1421, 1422, 1431, 1441, 1445, 1446,

1448, 1449, 1451, 1452, 1453, 1454, 1473, 1491, 1492, 1495.

In the category of 15

15A, 0015, 015A, 015B, 015T, AV15, 15, 15A0, 15AP, 15A0, 15B,

15B0, 15C, 15S, 15T, 15T0, 1500, 1511, 1522, 1513, 1521, 1525,

1527, 1531, 1537, 1545, 1546, 1548, 1549, 1551, 1552, 1553, 1554,

1571, 1572, 1574, 1575, 1591, 1592, 1595, 1597.

The database did not contain any 16 codes

In the category of 55

55A, 55A0, 5531, 555*, +55A, 055, 055.A.

APPENDIX C

CORRELATION MATRIX FOR SELECTED VARIABLES

	AGE	YOS	LRMC	PROM
AGE	1.00	0.80	0.73	-.14
YOS	0.80	1.00	0.69	-.07
LRMC	0.73	0.69	1.00	-.09
PROM	-.14	-.07	-.09	1.00

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